Characterisation of swellability and compressive and impact strength properties of corn husk fibre composites

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Short Communication

Characterisation of swellability and compressive and impact strength properties of corn husk fibre composites

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ABSTRACT

This study aims to investigate the impact and compressive strength properties of corn husk fibre (CHF)/polyester composites. The composites were subjected to water immersion treatment at two different durations. A polyester mixture with CHF of different fibre volume fractions was formed via hot press at 107 °C for 5 min. All composites were soaked in water for 24 and 72 h. Characterisation of impact and compressive strength, water absorption and thickness swelling properties of the composites were evaluated. The morphology of surface fractures of the composites was also analysed using scanning electron microscopy (SEM). Results show that the impact and compressive strength, thickness swelling and water absorption properties of the composites initially increased after 24 h of dyeing treatment. After soaking for 72 h, the moisture absorption and swellability properties of each composite increased by approximately 0.24%–1.38% and 0.08%–1.04%, respectively. Consequently, the impact strength of the composites increased, but the compressive strength decreased due to the weakened interface of polyester–fibres. SEM images show the interface between the fibres and the spread of fibres and voids. These results indicate that CHF composites can be an alternative for wood composites as construction materials.

1. Introduction

The use of natural fibres from corn (*Zea mays* L.), which is abundant, cheap and environmentally friendly, has considerable potential as a polymer composite filler. Several studies on strengthening polymers in terms of improving their mechanical and sound absorption properties by using wastes from corn plants have been published [1–3]. Sari et al. reported that the maximum tensile strength of the polyester–corn husk fibre composite is obtained at a volume fraction of 50%/50%, and the sound absorption coefficient at high frequencies of the composite can be obtained when the fibres are arranged randomly [1]. Xinyi et al. found that a sound-absorbing fibreboard from corn husk fibre/poly-lactic acid with a thickness of 2 mm has a sound absorption coefficient of 0.95 at 1600 Hz [4]. Compared with porous materials, corn husk is thin, light and has excellent acoustic absorption [5]. Luo et al. reported that the flexural modulus, tensile modulus, flexural strength and tensile break strength of high-density polyethylene (HDPE) composites made from corn stem and cob are better than those of composites made from corn leaf and ear fibres [2]. Youssef et al. stated that the corn husk fibre/r-ecycled low-density polyethylene (R-LDPE) composite with a fibre loading of 20% has a tensile strength and moduli of 17.7 ± 0.20 MPa and 410 ± 0.32 MPa, respectively, and the hardness is 3.02 ± 0.30 KP/mm^2; these properties contribute to the suitability of this composite for packaging applications [3]. Similarly, the 5%corn husk fibre (CHF) composite has high tensile strength without changes in elongation and surface contact angle (44°) [6]. Meanwhile, the aspect ratio of reinforcement Kenaf fibre and corn husk flour in biohybrid composites can be determined after extrusion, wherein the difference in tensile modulus from theoretical and experimental results is insignificant [7].

Most of the aforementioned studies focused on the mechanical properties of composites reinforced with wastes from corn plants. However, studies on impact and compressive strength, thickness swelling and water absorption properties of composites based on corn-husk fibre are limited. Luo et al. reported that HDPE composites with 50% corn fibre content made using an injection moulding machine have water absorption properties of 3.88%, which is higher than the 3.00% standard, due to the high hemicellulose content in the husk fibre [2]. Youssef et al. investigated the water absorption and swelling properties of cornhusk composite fibre/R-LDPE. They found that the maximum percentage of water absorption and swelling (87% and 31.21%,

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Fig. 1. Material preparation process. a. Cornhusk waste; b. Soaking corn husk in water; c. CHF retrieval; d. Raw CHF.

Fig. 2. Chemical treatment process. a. Soaking CHF in 8% NaOH for 2 h; b. CHF washing; c. Drying process of CHF.

Table 1
Composition of CHF/polyester ratio of composites.

	Nomenclature
FC2,5	Polyester composite with 2.5% CHF volume fraction
FC5	Polyester composite with 5% CHF volume fraction
FC10	Polyester composite with 10% CHF volume fraction
FC15	Polyester composite with 10% CHF volume fraction

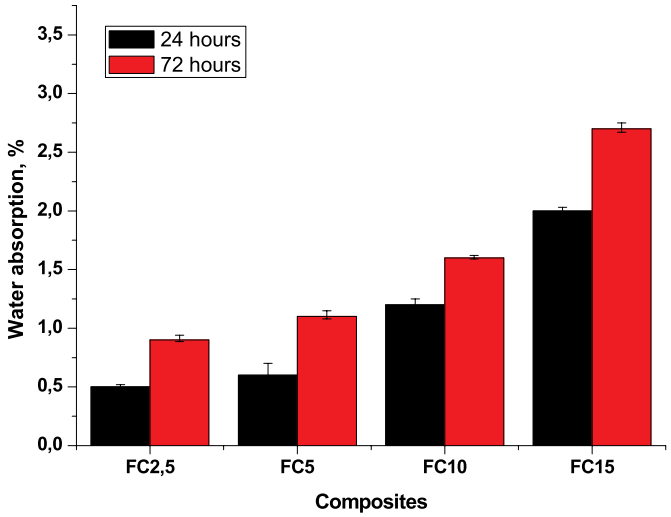

Fig. 3. Water absorption rates of different composites in this study.

respectively) of the composites was attained after the samples were immersed in water for two weeks [3]. Other studies reported that the amount of water absorbed in various natural fibre composites have different effects on the mechanical properties of polymer composites [8–13]. These previous studies only investigated the water absorption properties of composites but did not explain the effect of water immersion on the mechanical, physical and morphological properties of

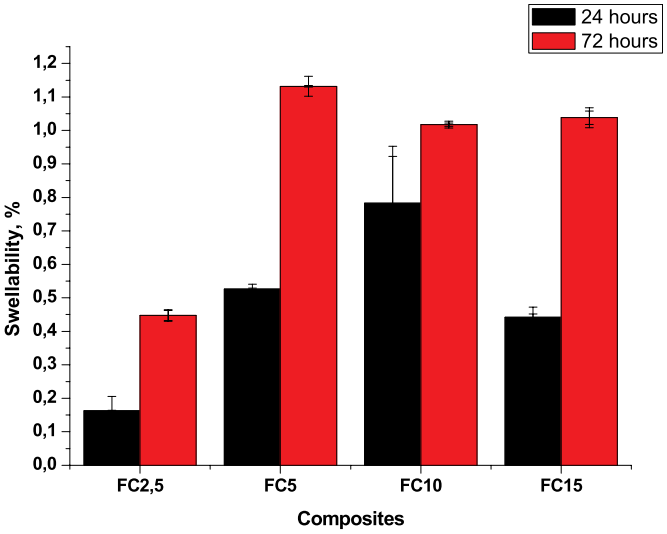

Fig. 4. Swellability of different composites in this study.

composites.

Investigating the mechanical properties of composite materials under a wet environment is important to evaluate the consequences of water absorption. In the present study, the characterisation of composites based on CHF and polyester in wet environments was presented and comprehensively discussed. The effects of fibre content and time of water immersion on the swellability, compressive and impact strength and morphological properties of the fracture surfaces of the composites were examined.

2. Materials and methods

2.1. Materials

CHF was obtained from corn husk wastes collected from the Pagesangan area, West Nusa Tenggara, Indonesia. Corn husks were selected

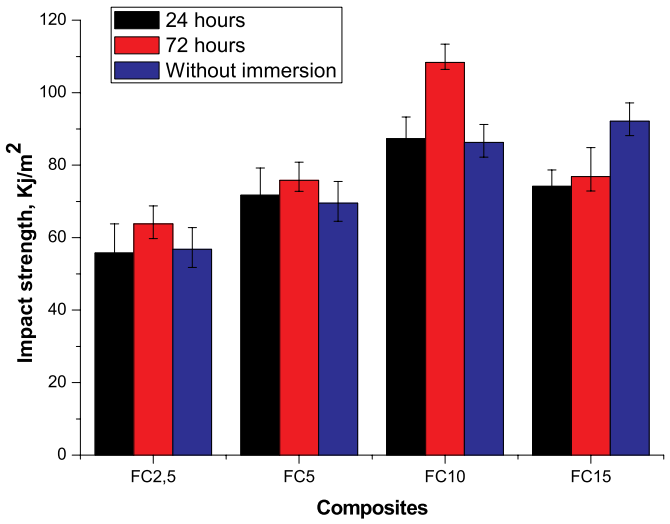

Fig. 5. Impact strength of CHF/polyester composites in this study.

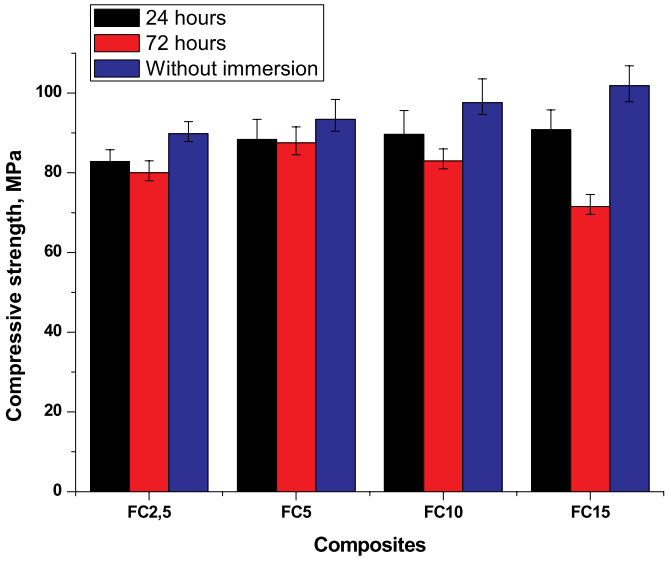

Fig. 6. Compressive strengths of different composites in this study.

from the outer skin to obtain uniform fibres. The husks were soaked in freshwater for 10 days to undergo bacterial micro-processes [14]. The fibres were collected using plastic and then aerated under the sun. These fibres were stored in a storage box with a humidity of 30%. The CHF retrieval process is shown in Fig. 1.

Polyester resin Yukalac 2250-EX was supplied by PT. Justus Kimia Raya, Surabaya, Indonesia. The specifications of the resin are as follows: a density of 1.9 gr/cm^3, a viscosity of 6–8 (25 °C), a tensile strength of 8.8 Kg/mm^2 and a melting temperature of 110 °C-200 °C [1].

2.2. Chemical treatment on CHF surface

CHF was soaked in 8% NaOH for 120 min, rinsed with freshwater, dried under the sun and stored in a box with 30% humidity (Fig. 2a, b and 2c). The diameter of the fibres was 0.124 ± 0.02 mm, and the percentages of cellulose, lignin and hemicellulose content of cornhusk fibres NaOH treatment were 62.87%, 13.62% and 5.55%, respectively [14].

2.3. Preparation of composites

Composite samples were made via a hot press technique. The prepared CHF was cut to 40 mm in length and placed in a mould. Polyester resin was poured into a mould that has been filled with fibres, and pressed at 105 °C and 5 MPa for 4 min, followed by cooling at room temperature at 3 MPa. Four different composite samples were produced. The ratios of fibres and polyester of the composites are shown in Table 1.

Before testing, all test samples were immersed in distilled water at two different periods, namely, 24 and 72 h. A total of 72 test samples were characterised by repeating each variation three times.

2.4. Characterisation of composites

2.4.1. Water absorption test

The dimension of the samples for the water absorption and swelling tests was 76.2 mm × 25.4 mm × 6 mm. The water absorption test was conducted according to the ASTM D570–18 standards [15]. The composite samples were dried in an oven at 50 °C for 24 h and placed in a desiccator for cooling before testing. The samples were then weighed and reported as the initial dry weight of the sample (*Mo*). Afterwards, the composite samples were soaked in distilled water for a predetermined time and then removed from the container. The water on the surface of the samples was wiped, and then the samples were weighed again (M_1).

Water absorption is expressed as an increase in weight percent and calculated by Equation (1) [16]:

$$Water\ absorption\ (\%) = \frac{(M_1 - M_o)}{M_1} \times 100 \quad (1)$$

where M_o is the initial dry weight of the composite sample (g), and M_1 is the weight of the composite after water absorption (g).

2.4.2. Swellability test

In the swellability test, the thickness of each composite sample was measured. The swellability percentage of composites was determined using Equation (2) [3]:

$$Swellability\ (\%) = \frac{(x - y)}{y} \times 100, \quad (2)$$

where x and y are the volumes of the composite after and before soaking (cm^3), respectively.

2.4.3. Impact test

The impact tests of composites with a dimension of 55 mm × 10 mm × 10 mm were performed using an Impact Charpy Testing Machine Model IT-30. The tests were conducted according to the ASTM D256 standards.

2.4.4. Compression test

The compression tests were performed using universal testing machines with displacement control and conducted according to the ASTMD–695-15 standards [17]. The dimension of the samples was 135 mm × 10 mm × 4 mm with a span set to 15 mm.

2.4.5. Scanning electron microscopy (SEM)

The fracture surfaces of the CHF/polyester composite samples were characterised using high-resolution field-emission SEM (type s50). The SEM was operated at an emission current of 47 μA and an accelerating voltage of 1–5 kV. The samples were coated with a thin layer of gold of approximately 50 nm in thickness.

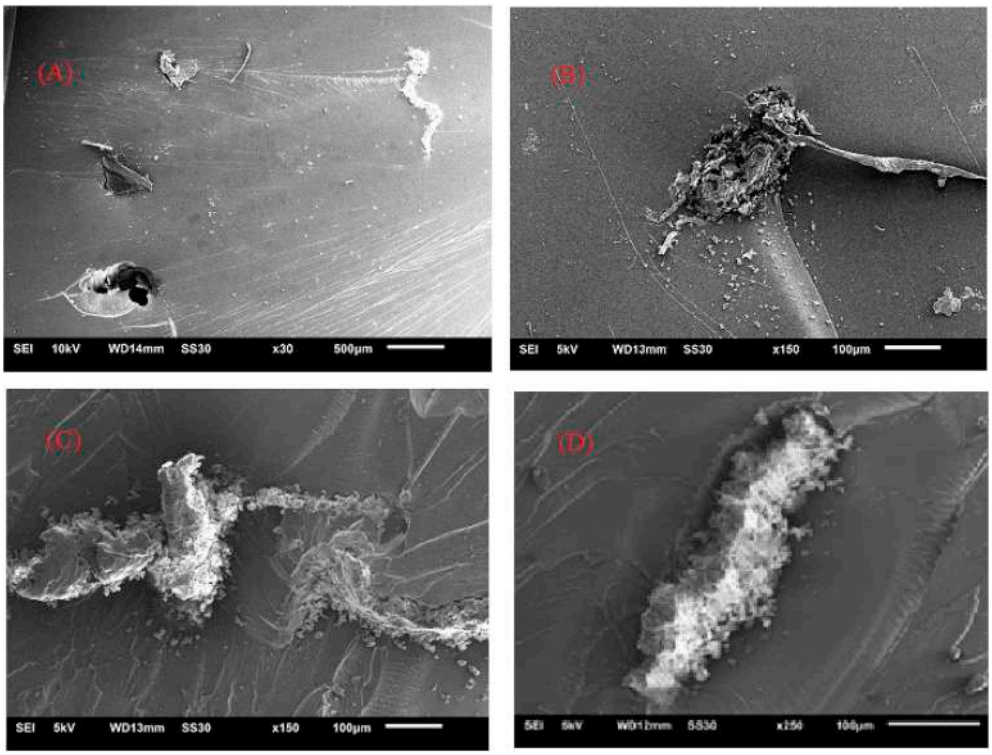

Fig. 7. SEM images of polyester/CHF composites before immersed in water, a. FC2.5, b. FC5, c. FC10 and d. FC15.

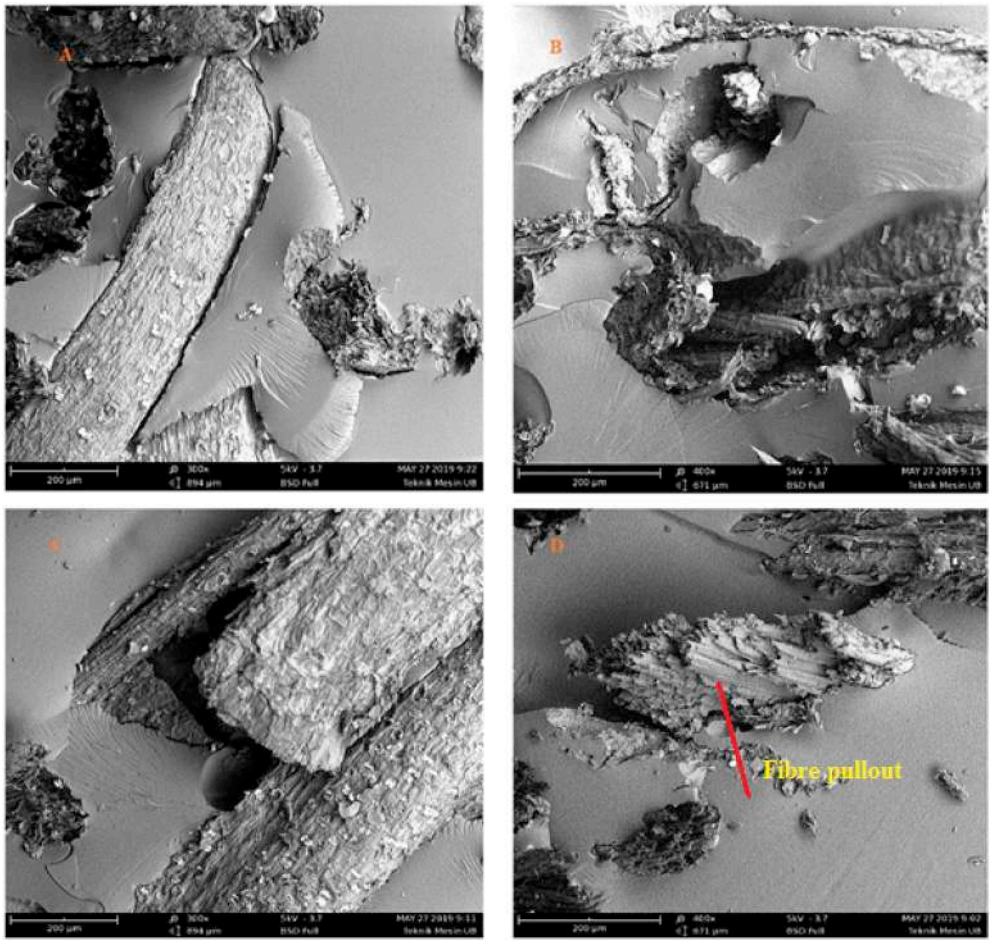

Fig. 8. SEM images of polyester/CHF composites after water immersion for 24 h, a. FC2.5, b. FC5, c. FC10 and d. FC15.

3. Result and discussion

3.1. Water absorption analysis

The water absorption capacity of the CHF/polyester composites is shown in Fig. 3. After immersion in water for 24 h, the water absorption value varied from 0.24% to 0.58%; after 72 h of water immersion, water absorption increased from 0.98% to 1.38%.Water absorption also increased with CHF content in the composite. This increase in water absorption is mainly due to the presence of fine pores, hydrogen bonds, lumen in the CHF [14], gaps in the interface and microcracks in the matrix that formed during the compounding process [18]. After soaking in water for 24 and 72 h, the FC15 sample exhibited the highest percentage of water absorption amongst that of the other fibre composite (FC) samples.

Fig. 3 shows that after immersion in water for 72 h, the FC10 sample had the lowest absorption value amongst that of the FC2.5, FC5 and FC15 samples. The FC samples are assumed to have good interfacial bonds such that the interface width between fibres is reduced, thereby reducing water absorption through this area to the inside of the material.

Furthermore, the water absorption value of CHF/polyester composites after immersion in water for 24 h (0.24%–0.58%) was lower than that of composite wood PP (2.34%–7.5%) after25 h of water immersion [19] and national standards (3.00%) [2]. These results indicate that CHF composites can be a substitute for wood–PP composites as building materials.

3.2. Swellability analysis

The swellability of FC composites increased with water absorption (Fig. 4). The value of swelling thickness after 24 h of water immersion varied from 0.08% to 0.44%.These values increased after 72 h of water immersion, varying from 0.45% to 1.04%. The swellability of CHF–polyester composites exhibited the same trend as that of water absorption, wherein composites with high water absorption also showed high swellability (Fig. 4). Thus, the swelling rate of FC composites was influenced by water absorption due to the same mechanism as that of water absorption.

The lowest water absorption and swellability values were obtained from the sample FC2.5. This sample is associated with dispersion phases and good adhesion between CHF/PE, which reduced the interface width between fibres and the water uptake through this part to the interior of the composite. By contrast, the wide gap between PE and polyester trapped additional water molecules in the interface area. This assumption possibly explains why the FC5 sample had the highest swellability amongst that of the other samples. These results were confirmed using SEM images in the next section.

3.3. Impact strength analysis

The impact strength of CHF/polyester composites is shown in Fig. 5. After water immersion for 24 h, the composites exhibited impact strength values varying from 485.53 kJ/m^2 to 902.72 kJ/m^2. After soaking for 72 h, the impact strength values increased from 651.52 kJ/m^2 to 1173.99 kJ/m^2 as the amount of CHF in the composites increased. The increase in impact strength of FC composites was probably due to the entry of large amounts of water into the fibres. Moreover, this increase clogged the cracks and broke them along the CHF–resin interface, thereby resulting in high impact strength.

The lowest impact strength value of the composites was obtained from sample FC15. This sample is associated with a high degree of integrity due to the incorporation of CHF into the polyester and fibre pullout. This result was confirmed by SEM images (Fig. 7d).

3.4. Compressive strength analysis

The compressive strengths of the CHF/polyester composites are shown in Fig. 6. The compressive strength of the composites after soaking in water for 24 h increased. However, the compressive strength decreased with increasing amounts of fibres in the composites after soaking for 72 h. This decrease occurred because of the technical microbuckling and delamination of composites. No microbuckling appeared on the fibres. The initial cracks that occurred on the polyester matrix during compression testing pressed together, thereby avoiding propagation. Van Vuure et al. [20] stated that buckling of composites occurs because cracks in the matrix propagate hard through the composites and cause fibre damage.

When the CHF content was increased, the polyester was no longer continuously distributed, and many CHFs were in direct contact with one another; this condition led to poor bonding at the interface due to the poor dispersion and wettability, resulting in low compressive strength. The occurrence of bonds between fillers and matrices can be explained by esterification [21].

The increase in compressive strength values of the FC composites was due to the excellent stress propagation between the filler and the matrix, resulting in enhanced compressive strength in response to stress. This finding is contributed to the increased composite compressive strength after 24 h of immersion in water.

3.5. Morphological studies

The morphologies of the fractured surfaces of the CHF/polyester composites tested in impact were examined using SEM. The SEM images of the polyester composites at fibre volume fractions of 2.5%, 5%, 10% and 15% are shown in Figs. 7 and 8. Fig. 7 shows a dense interface between the resin-CHF and fracture occurs along the resin in the composite before soaked in water (Fig. 7a, b, 7c and 7d); which cause impact and compressive strength is high. Furthermore, Fig. 8 demonstrate the existence of a gap between polyester and CHF. After immersion in water for 24 h, the CHF is remained strongly bound to the polyester resin and interface fractures along the fibres (Fig. 8a, b and 8c), resulting in high impact and compressive strengths. In addition to the interface fracture, Fig. 8d shows that failure is also followed by several fibre pullouts and damage. Thus, FC15 sample composites exhibited the lowest impact strength amongst that of other FC composites.

4. Conclusion

The swellability, impact and compressive strength of composite CHFs in water were investigated. Results showed that after 24 h of water immersion, the impact and compressive strengths increased with CHF contents. After 72 h of water immersion, the impact strength increased whilst the compressive strength of the composites decreased. This phenomenon is attributed to the hard propagation of cracks in polyester and fibre damage. The swelling and water absorption values of composites increased due to the presence of lumen, hydrogen bond and gaps in the fibres. The presence of several interfacial fractures and fibre pullouts was observed using SEM images. This novel composite can be a substitute for saw wood composites as building materials.

Declaration of competing interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

CRediT authorship contribution statement

Nasmi Herlina Sari: Conceptualization, Project administration, Data curation, Writing - original draft. **Jauhar Fajrin:** Formal analysis, Resources, Data curation. **Suteja:** Writing - original draft, Investigation,

Methodology. **Ahmad Fudholi:** Writing - original draft, Writing - review & editing.

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References

[1] N.H. Sari, I.N.G. Wardana, Y.S. Irawan, E. Siswanto, Corn husk fiber–polyester composites as sound absorber: nonacoustical and acoustical properties, Adv. Acoust. Vib. 2017 (2017), https://doi.org/10.1155/2017/4319389.

[2] Z. Luo, P. Li, D. Cai, Q. Chen, P. Qin, T. Tan, H. Cao, Comparison of performances of corn fiber plastic composites made from different parts of corn stalk, Ind. Crop. Prod. 95 (2017) 521–527, https://doi.org/10.1016/j.indcrop.2016.11.005.

[3] A.M. Youssef, A.E. Gendy, S. Kamel, Evaluation of corn husk fibers reinforced recycled low density polyethylene composites, Mater. Chem. Phys. (2014) 1–8.

[4] Z. Xinyi, L. Lihua, W. Chunyan, C. Yongzhu, Fabrication and sound absorption properties of corn husk fiber/polylactic acid composite materials, J. Dalian Polytech. Univ. (2015). http://en.cnki.com.cn/Article_en/CJFDTotal-DLQG201505015.htm.

[5] X. Tang, X. Zhang, H. Zhang, X. Zhuang, X. Yan, Corn husk for noise reduction: robust acoustic absorption and reduced thickness, Appl. Acoust. 134 (2018) 60–68.

[6] D.C. Bernhardt, C.D. Pérez, E.N. Fissore, M.D. De'Nobili, A.M. Rojas, Pectin–based composite film: effect of corn husk fiber concentration on their properties, Carbohydr. Polym. (2017), https://doi.org/10.1016/j.carbpol.2017.01.031. https://search.crossref.org/?q=Pectin%E2%80%93based+composite+film%3A+effect+of+corn+husk+fiber+concentration+on+their+properties.

[7] H.J. Kwon, J. Sunthornvarabhas, J.W. Park, J.H. Lee, J.J. Kim, K. Piyachomkwan, K. Sriroth, D. Cho, Tensile properties of Kenaf fiber and corn husk flour reinforced poly(lactic acid) hybrid bio–composites: role of aspect ratio of natural fibers, Composites: Part B (2013), https://doi.org/10.1016/j.compositesb.2013.08.003.

[8] E. Syafri, Jamaluddin, S. Wahono, A. Irwan, M. Asrofi, N.H. Sari, A. Fudholi, Characterization and properties of cellulose microfibers from water hyacinth filled sago starch biocomposites, Int. J. Biol. Macromol. 137 (2019) 119–125.

[9] G. Gerezgiher, A. BsratH, SimonA, SzaboT, Development and characterization of sisal fiber reinforced polypropylene composite materials, Int. J. Eng. Manag. Sci. (IJEMS) 4 (1) (2019), https://doi.org/10.21791/IJEMS.2019.1.43.

[10] R. Muthuraj, C. Lacoste, P. Lacroix, A. Bergeret, Sustainable thermal insulation biocomposites from rice husk, wheat husk, wood fibers and textile waste fibers: elaboration and performances evaluation, Ind. Crop. Prod. 135 (2019) 238–245.

[11] A. Atiqah, M. Jawaid, M.R. Ishak, M. SapuanS, Moisture absorption and thickness swelling behaviour of sugar palm fibre reinforced thermoplastic polyurethane. Advances in material & processing technologies conference, Procedia Eng. 184 (2017) 581–586, https://doi.org/10.1016/j.proeng.2017.04.142.

[12] E. Syafri, A. Kasim, H. Abral, G.T. Sulungbudi, M.R. Sanjay, N.H. Sari, Synthesis and characterization of cellulose nanofibers (CNF) ramie reinforced cassava starch hybrid composites, Int. J. Biol. Macromol. 120 (2018) 578–586.

[13] U. Huner, Effect of water absorption on the mechanical properties of flax fiber reinforced epoxy composites, Adv. Sci. Technol. Res. J. 9 (26) (2015) 1–6, https://doi.org/10.12913/22998624/2357.

[14] N.H. Sari, I.N.G. Wardana, Y.S. Irawan, E. Siswanto, Characterization of the chemical, physical, and mechanical properties of NaOH–treated natural cellulosic fibers from corn husks, J. Nat. Fibers 15 (4) (2018) 545–558, https://doi.org/10.1080/15440478.2017.1349707.

[15] ASTM D570–18, Standard Test Method for Water Absorption of Plastics, ASTM International Standards, West Conshohocken, PA, 2018.

[16] H.Y. Wang, D.G. Li, Y.M. Wang, et al., Cross–sectional stiffness analysis and support span calculation of WPC decking, Appl. Mech. Mater. (2012) 3175–3180.

[17] ASTM D695-15, Standard Test Method for Compressive Properties of Rigid Plastics, ASTM International, West Conshohocken, PA, 2015.

[18] H.P.S.A. Khalil, S.B.S. Shahnaz, M.M. Ratnam, F. Ahmad, N.A. Nik Fuaad, Recycle polypropylene (RPP) – wood sawdust composites – Part 1: the effect of different filler size and filler loading on mechanical and water absorption properties, J. Reinforc. Plast. Compos. 25 (12) (2006) 1291–1303.

[19] K.S. Chun, N.M.Y. Fahamy, C.Y. Yeng, H.L. Choo, P.M. Meng, K.Y. Tshai, Wood plastic composites made from corn husk fiber and recycled polystyrene foam, J. Eng. Sci. Technol. 13 (2018) 3445–3456.

[20] A.W. Van Vuure, J. Baets, K. Wouters, K. Hendrickx, Compressive properties of natural fibre composites, Mater. Lett. 149 (2015) 138–140, https://doi.org/10.1016/j.matlet.2015.01.158.

[21] M. Kazayawoko, J.J. Balatinecz, R.T. Woodhams, Diffuse reflectance Fourier transform infrared spectra of wood fibres treated with maleated polypropylenes, J. Appl. Polym. Sci. 66 (6) (1997) 1163–1173.

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Highlights

- The impact and compressive strength properties of corn husk fiber (CHF)/polyester composites was investigated.
- Characterization of impact and compressive strength, water absorption, and thickness swelling properties were evaluated.
- Morphology of surface fractures from composites also was analyzed using Scanning electronic microscopy (SEM).
- SEM photos display the interface between the fibers, the spread of fibers and voids.
- CHF composites can be an alternative for waterproof construction materials instead of flax fiber composites.

Abstract

This study aims to investigate the impact and compressive strength properties of corn husk fibre (CHF)/polyester composites. The composites were subjected to water immersion treatment at two different durations. A polyester mixture with CHF of different fibre volume fractions was formed via hot press at 107 °C for 5 min. All composites were soaked in water for 24 and 72 h. Characterisation of impact and compressive strength, water absorption and thickness swelling properties of the composites were evaluated. The morphology of surface fractures of the composites was also analysed using scanning electron microscopy (SEM). Results show that the impact and compressive strength, thickness swelling and water absorption properties of the composites initially increased after

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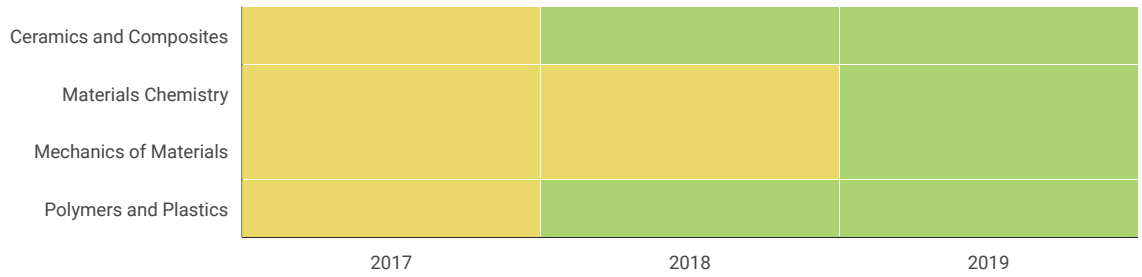

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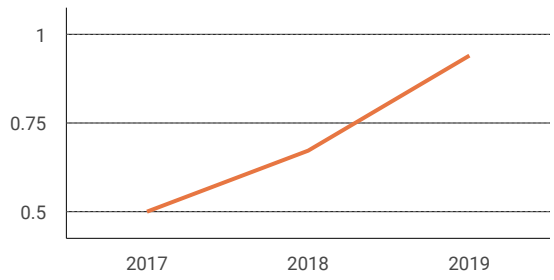

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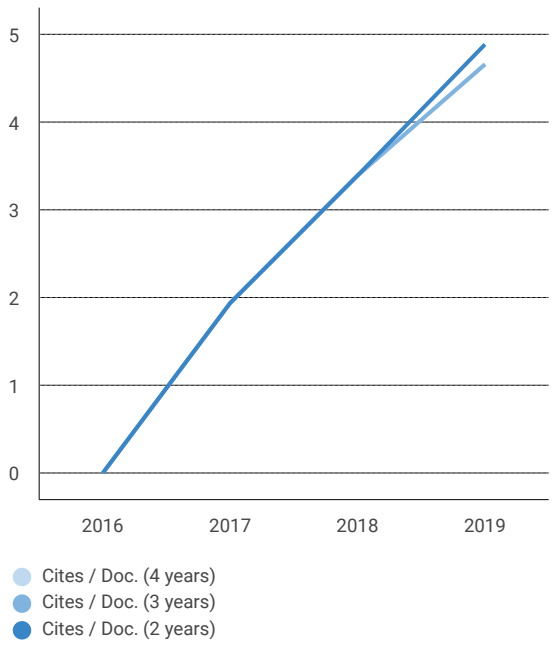

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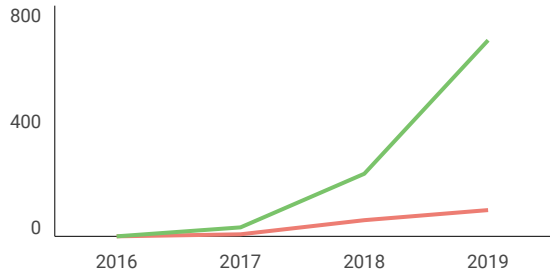

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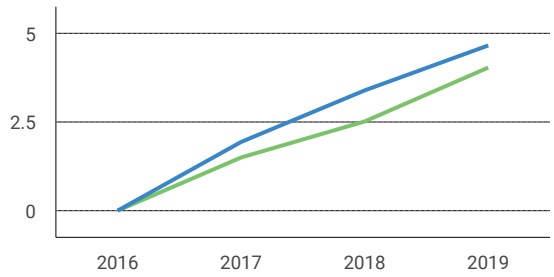

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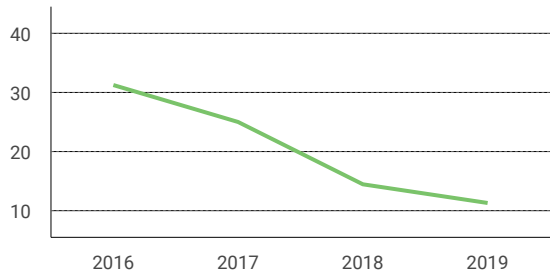

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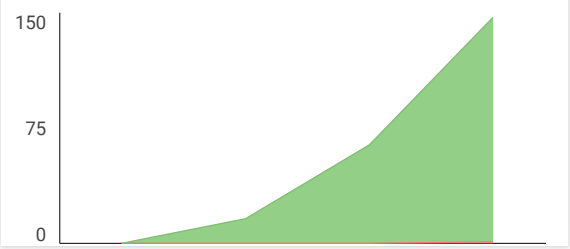

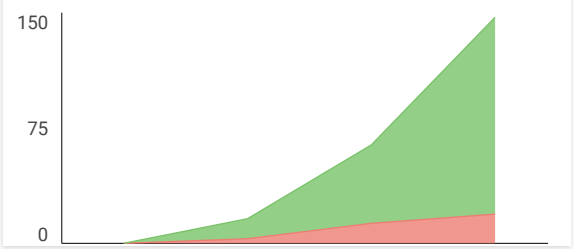

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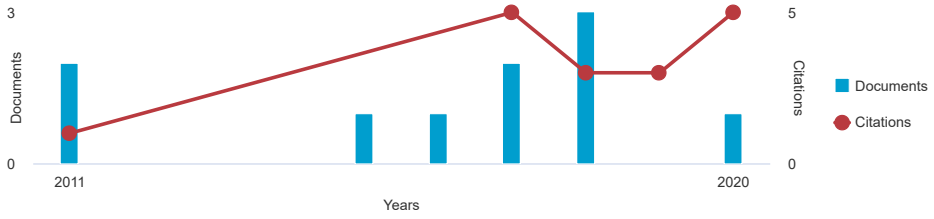

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